Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Expanding Flexible Use of the 3.7 to 4.2 GHz Band	)	GN Docket No. 18-122
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz (Inquiry Terminated as to 3.3-4.2 GHz)	)	GN Docket No. 17-183
	)	
Petition for Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3.7-4.2 GHz Band)	)	RM-11791
	)	
Fixed Wireless Communications Coalition, Inc. Request for Modified Coordination Procedures in Band Shared Between the Fixed Service and the Fixed Satellite Service	)	RM-11778

INITIAL COMMENTS OF PSSI GLOBAL

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Dated: October 29, 2018

SUMMARY

PSSI Global Services, L.L.C. ("PSSI Global"), is the leading full-service satellite transmission company in the United States. It is the predominant transportable user of the collective C-band pair of 3.7-4.2 GHz band (space-to-Earth for downlink), and the 5.925-6.425 GHz band (Earth-to-space for uplink) in the United States. As a result, PSSI Global has a substantial interest in this proceeding.

PSSI Global opposes the Commission's proposal in the Notice of Proposed Rulemaking[1] to open the C-band to use by terrestrial mobile carriers.

The firm specializes in live event transmission delivery and program insert reception for integration to hundreds of customers (and, in turn, millions of viewers across the country). This involves thousands of transmission event days per year. Although styled "occasional use" in the industry (to contrast with full-time programmers), these services involve a substantial use of the C-band and are essential to PSSI operations and our many customers who rely upon "occasional use" on a daily basis. They will be substantially impacted by the rules proposed in the NPRM.

If the Commission determines to permit terrestrial mobile use in the C-band, it should be limited to 100 MHz. Anything more would severely limit the ability of firms like PSSI Global to continue to operate. Our business depends on the continued operability of the full-band/full-arc frequency coordination procedures. Accordingly, there is no place for point-to-multi point ("P2MP") service in the C-band, as argued by the Fixed Wireless Communications Coalition.

If the Commission determines to allocate C-band spectrum to terrestrial mobile use, it

[1] *In re Expanding Flexible Use of the 3.7 to 4.2 GHz Band in GN Docket No. 18-122 (Order and Notice of Proposed Rulemaking)*, 33 FCC Rcd ____, FCC 18-91, released July 13, 2018 ("NPRM").

should employ a market-based mechanism, rather than an auction, to allocate the spectrum and grant licenses.

Further, the Commission must include in any new rules strict provisions for the compensation of C-band users that would not be able to continue their business without the full-band/full-arc policies currently in effect.

In doing so, the Commission should adopt its proposal for a Transition Facilitator. However, such a mechanism should also include in its supervisory board and management representatives of the "user" community, including satellite transportable companies like PSSI Global, as well as the media users of the C-band spectrum.

There is truly no substitute for the efficiency and productivity of the C-band spectrum. The Commission should determine not to adopt the proposals in the NPRM and otherwise adopt the remedies set out in PSSI Global's Comments. Changes cannot be implemented without substantially damaging businesses like transportable mobile companies like PSSI Global.

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INITIAL COMMENTS OF PSSI GLOBAL

PSSI GLOBAL SERVICES, L.L.C. ("PSSI Global") responds to the Notice of Proposed Rulemaking ("NPRM")[1] adopted by the Federal Communications Commission in this proceeding.[2] In this NPRM, the Commission has sought feedback on proposals to permit terrestrial mobile use of the 3700-4200 MHz band (the "C-band") and otherwise change the existing regulatory structure for the C-band. In these Comments, PSSI Global sets out its preferred policy outcomes and alternatives as the Commission considers changes in the C-band. In addition, PSSI Global addresses specific questions posed in the NPRM.

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[1] In re Expanding Flexible Use of the 3.7 to 4.2 GHz Band in GN Docket No. 18-122 (Order and Notice of Proposed Rulemaking), 33 FCC Rcd ____, FCC 18-91, released July 13, 2018 ("NPRM").

[2] These comments are timely filed. The summary of the NPRM was published in the Federal Register on August 29, 2018, and established October 29, 2018 as the deadline for filing comments. 83 FR 44128 (Aug. 29, 2018).

A. Background

PSSI is a Global Leader Among Transportable Mobile Operators

1. PSSI Global is the leading full-service satellite transmission company in the United States. The company is based in Las Vegas, Nevada, with offices in California, Massachusetts, and Florida, along with its full-service teleport in Pittsburgh, Pennsylvania. We combine 32 years of engineering service and know-how with an expansive fleet of more than 75 C-band and Ku-band fully redundant satellite transportable uplink/downlink trucks and flyaway systems covering the entire United States. PSSI Global is the largest provider of these type of services in the United States.

2. The company operates in what the Commission has called in the NPRM the "conventional C-band."[3] PSSI Global is the predominant transportable user of the collective C-band pair of 3.7-4.2 GHz band (space-to-Earth for downlink), and the 5.925-6.425 GHz band (Earth-to-space for uplink) in the United States. As a result, PSSI Global has a substantial interest in this proceeding. Many of the changes proposed in the NPRM, as set out in these Comments, will have a negative impact on the company and other transportable mobile operators.

3. PSSI Global specializes in live event transmission delivery and program insert reception for integration to hundreds of customers (and, in turn, millions of viewers across the country). This involves thousands of transmission event days per year. Although styled "occasional use" in the industry (to contrast with full-time programmers), these services involve a substantial use of the C-band and are essential to PSSI operations and our many customers who rely upon "occasional use" on a daily basis. These transmissions include sports, entertainment, pay-per-view, corporate, news, and government type service coverage of television events and services domestically and worldwide. Our

[3] NPRM, ¶10.

customers include all the major sports and cable networks, including ABC, CBS, Fox, NBC, ESPN, Fox Sports, Comcast, Turner, HBO, CNN, Showtime, NASCAR, WWE, UFC, Top Rank, and Golf Channel, among others. Major video viewing events that rely upon PSSI Global's C-band capabilities include the annual Academy Awards, as well as nearly every other live award event, such as the Grammy Awards, the Prime-Time Emmy Awards, People's Choice Awards, etc. PSSI Global also facilitates live coverage for the NFL Super Bowl (and other important NFL games), Major League Baseball World Series (and all MLB playoffs, and All Star events, etc.), The Masters (and all PGA golf events), Daytona 500 (and all NASCAR series events), NBA Playoffs, NCAA Men and Women's major playoffs, football bowl games, and basketball championships, and nearly every major Pay-Per-View ("PPV") event (such as the Mayweather vs. McGregor fight, and even the upcoming Tiger Woods vs. Phil Mickelson Golf PPV challenge this November, for example). All these special events rely on transportable C-Band truck facilities for reliable service and coverage.

4. PSSI Global's leadership and expertise in the field is being recognized by the Television Academy of Arts and Sciences, which in 2019 will award PSSI Global a special Emmy Award for technical excellence at the NAB annual show for excellence in support of our client NASCAR in being able to transmit 28 paths out of one satellite truck. This would not have been technically possible without use of the C-band as we are able to operate today.

How PSSI Global Operates to Serve its Clients – Full Band/Full Arc

5. PSSI Global has more than 25 C-band uplink trucks and flyaway systems in its fleet, including four C-band/Ku-band (dual dish) vehicles, one C-band/C-band (dual dish) vehicle and 17 C-band (single dish) antenna vehicles. Our fleet is deployed throughout the United States, Canada, Mexico and the Caribbean for rapid local response. Our mobile truck platforms consist of units that have 2.4m,

4.5m and 5.5m satellite antennas. In many cases, we may have ten (10), fourteen (14) or more digital encoders and decoders on board a satellite truck to provide more complex multiplexed operations and services. PSSI Global has invested millions annually in C-band capability, including antennas, amplifiers, encoders, decoders, and other electronic equipment. Even today, we have multiple C-Band amplifiers and antennae on order for C-band system improvement and expansion. Our typical C-Band transportable service lasts 1-2 days for a simple back haul, 3-4 days for a pay-per-view type event, and 5 days or more for a golf tournament or other longer length event.

6. The company's fleet also includes approximately 50 Ku-band vehicles. PSSI Global's News Group owns and operates and provides all U.S. domestic CNN satellite transportable transmission services. Although the Ku-band is used intensively and daily in electronic news gathering operations, it is less dependable for use in major live sports and entertainment programs, as explained in greater detail below, because it is susceptible to signal degradation, particularly in adverse weather conditions, and is not suitable for large multi-path multiplexed event transmission solutions.

7. Under the rules and policies currently in effect for the C-Band, PSSI can react efficiently and rapidly to meet customer needs for the safe and reliable transmission of services from a particular venue, without our causing interference to others, or being interfered with ourselves. Because our licensed transportable earth stations have no fixed latitude and longitude, we must coordinate with others using the C-band for each venue from which we intend to transmit. To do so, we must verify what frequencies in the C-band spectrum are clear for us to transmit to (and receive from) at a given location. PSSI Global must then check with the satellite carriers to see what transponders they have available that will clear from a given location and work for our customer to receive at their own fixed facility. On many occasions, our customer's request for transmission from a certain venue comes to us

at late notice. In these cases, a frequency coordination study must be done immediately. Examples of this are when new events are announced, or broadcast customers have determined what weekly NCAA game they are allowed to cover on their schedule that is shared with other broadcasters - some get the first pick of games over others in their rights deals, or sports playoffs (like the World Series, NFL playoffs, or NCAA playoffs - for example) that determine winners and subsequent game locations based on certain game results.

8. A recent case in point is the World Series 2018. For example, until the Los Angeles Dodgers and Boston Red Sox won their respective league championships (Dodgers did not win until Saturday, October 20), there was no way that Fox Sports could be certain from where they would need to be present for Fox's World Series C-band transmission coverage that began on October 23, 2018.

9. Once a location is determined, a C-band radio frequency interference coordination study and analysis is performed with Comsearch or Micronet. Then we can determine what frequency(s) we can utilize and proceed from there to find an available space segment for our customers. With many of the proposed changes to the current full-band, full-arc policy, this essential flexibility would no longer be possible.

Case Studies Demonstrate That C-Band Best Serves Customer Needs

10. In Exhibits 1-5, PSSI Global provides detailed examples of customers for whom we work (including College Football for ESPN and FOX, NASCAR, UFC, WWE, and The Golf Channel) and for whom we provide many C-Band services. These include multiple C-band services at their same events – especially for our PPV customers, who demand multiple C-Band transmissions from the same event venue, like Top Rank, Showtime, HBO, Golden Boy, and all the major television network and cable entities (See Exhibit 6 for a discussion of PPV events). These examples of work for customers

are included and are incorporated into these Comments.

11. ESPN College Football and Basketball, NASCAR and The Golf Channel illustrate well the importance of continued robust C-band capability, which, in turn, depends on the current full-band, full-arc coordination procedures.

12. **College Football and Basketball for ESPN**. Throughout the regular seasons, PSSI Global provides ESPN with multiplexed C-band transmissions for their "at-home" productions of college football, basketball, and other athletic events. The football games, for example, require up to 10 channels of video with 4 audios on each channel distributed back from the game venue to ESPN headquarters in Bristol, Connecticut. ESPN produces the game at Bristol for broadcast. These games require, on average, 10 hours of C-band space segment, and the 10-channel transmissions utilizing 54 MHz of bandwidth. C-band transmission is required and preferred by our customers due to the possibility of rain both at origination and receive sites and the customers' experience over many years. Ku-band is not a viable alternative because of its unreliability in such conditions[4].

13. Major bowl events for the NCAA College Football National Championships depend even more on the availability of C-band frequencies than regular games. For example, for the so-called "Big 6" Bowl games as well as the College Football National Championship, ESPN requires multiple C-band uplinks. The "Big 6" -- Rose, Sugar, Cotton, Orange, Fiesta, and Peach Bowls – require up to 10 channels of multiplexed video and audio for distribution back to ESPN headquarters at Bristol. . For

[4] As noted at several points in these comments, Ku-band is not a substitute for C-band. The possibility of rain at live events makes dependence upon Ku-band transmission unfeasible, given the Ku-band's susceptibility to signal attenuation and rain fade (absorption of a microwave radio frequency (RF) signal by atmospheric rain, snow, or ice, and losses which are especially prevalent at frequencies above 11 GHz). It is also not physically possible to provide the high order modulation multi-path multiplexed solutions to our customers in the higher frequency Ku-band.

the Rose Bowl and Sugar Bowl, PSSI Global also encodes and multiplexes multiple video signals for distribution via fiber back to ESPN headquarters. These 10-channel or more transmissions are not possible in Ku-band[5] In addition to the games themselves, these transmissions include multiple days of ESPN programming, including press conferences, player interviews, and remote shows such as ESPN's "SportsCenter."

14. For the most recent NCAA National Championship Football Game, for example, even greater facilities are needed. For the National Championship, PSSI encoded, multiplexed, and transmitted 20 video paths, with 16 audio channels per path, between (2) C-band antennas. In addition to the game itself, this includes multiple days of ESPN programming, including press conferences, player interviews, and remote shows such as SportsCenter. PSSI also encoded and multiplexed 23 video paths for distribution via fiber back to ESPN headquarters in Bristol, both as a redundant means of transmission and to provide additional cameras and other content not included on the satellite paths.[6]

15. **NASCAR**. PSSI Global dedicates specific resources and staff to NASCAR on a full-time basis. The C27 is a dual C-band antenna tractor-trailer dedicated to the entire NASCAR Cup Series (and more) each year. We not only uplink multiple paths and all in-car audios, we also downlink their composite return from Charlotte (NASCAR's production base) for integration into the onsite production as well as well as for distribution to video screens throughout the track venue. Therefore, the C-band satellite transport to and from each NASCAR track is essential not only for broadcast distribution to millions of NASCAR fans worldwide on multiple platforms, but also for the fan

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[5] Ku-band presents problems when higher order modulation is required for complex, high bandwidth, multi-path transmissions like the major football bowl events.

[6] It is important to note that the insurers of these multi-million-dollar events like the Mayweather vs. McGregor fight, the Oscars, and the NCAA Championship Game demand such redundant capabilities from their media clients, which is why PSSI must be able to provide such redundancies.

experience at the track itself.

16. Perhaps more than any customer, NASCAR has pushed PSSI Global Services to develop advanced technical solutions to an increasingly complex broadcast environment. Our mutual efforts have yielded an Emmy Award for Technical Excellence, to be announced in 2019. Our technological achievements would not have been possible with anything but C-band frequencies, as previously noted, the higher order modulation required for such complex, high bandwidth, multi-path transmissions would not be possible in Ku-band.

17. **The Golf Channel**. The Golf Channel provides another example of intensive C-band use. We provide C-band transmissions for all Golf Channel broadcasts, including tournament coverage, Golf Channel news, "Road Shows," and the Major gold championships played in the United States. For the Majors - the Masters, the US Open, and the PGA Championship - we also encode and multiplex for distribution via fiber. At each Major tournament in 2018, disruptions to the fiber infrastructure required multiple paths to be distributed via C-band uplink, including inbound feeds from Golf Channel headquarters in Orlando.

18. In the past year, PSSI has had a presence at more than 135 live Golf Channel tournaments and news broadcasts, usually from golf courses throughout the United States (plus Canada, Mexico and the Bahamas). At most golf courses, there is no fiber infrastructure, and we are the only transmission pathway available. Golf Channel requires C-band because of the frequency of inclement weather at their "receive site" in Orlando, Florida,[7] and because they will still transmit golf tournament news coverage from golf tournaments in inclement weather. Golf Channel does not have Ku-band receive capabilities. We provide C-band transmissions for all Golf Channel broadcasts, including tournament

[7] See note 4, *supra*.

coverage, Golf Channel news, "Road Shows," and the Major golf championships played in the United States. For the Majors - the Masters, the US Open, and the PGA Championship - we also encode and multiplex for distribution via fiber. At each Major in 2018, disruptions to the fiber infrastructure required multiple paths to be distributed via C-band uplink, including inbound feeds from Golf Channel headquarters in Orlando.

B. Argument and Comments

Changes in NPRM Would Have a Radical Impact on PSSI Global and the Industry

19. We have demonstrated above how PSSI Global, other transportable mobile operators and their media customers depend upon the continued availability of full-band/full arc in the C-band, particularly because client needs often arise at the last minute. Only such flexibility can accommodate the services that the client needs. Having seen how the business operates and requires flexibility in the C-band, it is evident how many of the changes proposed in the NPRM could have disastrous consequences for PSSI Global and other transportable mobile operators.

20. We are concerned about conflicting goals set out in the NPRM. The Commission is simultaneously pursuing the goal of making spectrum available for new terrestrial wireless use while balancing speed of bringing such service online and efficient of use of the spectrum. Yet the Commission also seeks to accommodate incumbent Fixed Satellite Service ("FSS") and Fixed Service ("FS") operations in the C-band. This balance is especially difficult in the case of our business when it comes to needed transportable uplink/downlink facilities and services. These competing concerns make us question the feasibility of sharing spectrum with terrestrial mobile carriers in the C-band.

21. Accordingly, from our company's perspective, the preferred and better option -- both for transportable mobile operators like PSSI Global, as well as the media customers that are PSSI Global's

principal clients -- is the retention of the status quo in the C-band.

22. However, if the Commission determines to permit terrestrial mobile operations in the C-band, there are some proposals, such as that of the C-Band Alliance(composed of Intelsat, SES and Eutelsat (the "Alliance")) which, with some safeguards for the transportable mobile operators such as PSSI Global could be a compromise, albeit one clearly less effective and beneficial for mobile transportable operators than the existing rules.[8]

23. PSSI Global's position regarding the proposals in the NPRM can be summarized in the following points:

- As stated above, PSSI Global believes the better policy alternative to those proposed in the NPRM is retention of the existing full-band/full-arc policy. The changes proposed by the NPRM to the full-band/full-arc will substantially damage transportable mobile operators like PSSI Global. We have great doubts that a shared spectrum approach in the C-band can ultimately succeed.
- If the Commission decides to require sharing of the band with terrestrial mobile, there will be progressively less spectrum available for occasional use by transportable mobile operators like PSSI Global to the extent that more than 100 MHz of bandwidth is released to terrestrial mobile use. The amount of spectrum set aside for terrestrial mobile should in any event not exceed 100 MHz.
- If the Commission decides to carve spectrum out of the C-band for terrestrial mobile use, the Commission should not proceed via auction but rather through the Alliance's market-based approach, as long as the approach includes protection for transportable uplink/downlink systems, and sufficient guaranteed occasional use C-band capacity for transportable usage. Bandwidth set aside for transportable C-Band operations should not be subject to pre-emption by carriers utilizing required, dedicated and assigned contractual back-up space for non-pre-emptible customer contracts. Occasional use customers must have the availability of dedicated non-pre-emptible bandwidth within at least 30 days of any scheduled event.
- Carriers should be obligated to designate and set aside a certain amount of bandwidth for non-

[8] Although Eutelsat was not originally a party to the proposal, on October 1, 2018, Intelsat, SES and Eutelsat reported the formation of the Alliance. "Establish the C-Band Alliance (CBA), a Consortium to Facilitate Clearing of U.S. Mid-band Spectrum for 5G While Protecting U.S. Content Distribution and Data Networks," Press Release, October 1, 2018. http://www.intelsat.com/news/press-release/intelsat-ses-eutelsat-and-telesat-establish-c-band-alliance/ In the NPRM, the Commission noted Eutelsat's interest in joining in such a market-based proposal. NPRM at ¶ 74.

preemptible occasional use.

- If the Commission decides upon the market-based approach, PSSI Global supports the creation of a Transitional Facilitation Cooperative, but only one which would include customers of the satellite downlinks. PSSI Global is prepared to serve as the representative of the transportable service providers.
- The consequences of a reduction in available bandwidth (pre-emptible and non-pre-emptible) will result in higher prices charged for spectrum, assuming there is still capacity for occasional use, and reduced business for transportable services.
- If the Commission proceeds with permitting terrestrial mobile service in the C-band, 20 months to clear incumbent users from the designated spectrum in the band as proposed by the Commission would be an acceptable time period.[9].
- The Fixed Wireless Communications Coalition ("FWCC") has proposed eliminating the full-band, full-arc coordination policy. Under no circumstances should the Commission permit point-to-multipoint ("P2MP") service in the C-band.[10]

With this background in mind, including PSSI Global's preferences, we address specific proposals in the NPRM.

24. **Alliance Proposal as Originally Submitted**. If the Commission ultimately decides to carve out spectrum for terrestrial mobile use, it should adopt a market-based approach.[11] It should not reallocate and authorize the spectrum by auction.

25. The proper management of the future of the C-band is critical to the continued vitality of our business, upon which our media customers depend for delivery of programming to their viewers. Thus, as PSSI Global has previously indicated to the Commission[12], we believe that a market-based approach, led by satellite operators, is the only practical solution for introducing terrestrial mobile operations in

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[9] NPRM, ¶ 94.

[10] See "Request for Modified Coordination Procedures in Bands Shared Between the Fixed Service and the Fixed Satellite Service, RM 11778, Petition for Rulemaking (Oct. 11, 2016), filed by FWCC. See also NPRM, at ¶ 38.

[11] NPRM, ¶ 64.

[12] June 25, 2018 *Ex Parte* Notice filed by PSSI Global, Intelsat and SES; NPRM, ¶ 85, n. 131.

the C-band, if the current regulatory structure is not retained. Such a market-based solution must involve cable systems, broadcasters and content delivery companies, which have been working with satellite operators for decades, in the transition and implementation process.

26. Satellite operators – working with the customers like PSSI Global -- understand the interests of our company and other incumbent users. The satellite operators can undertake the arduous and costly task of clearing spectrum for terrestrial mobile use. Such a market-based approach can more rapidly permit introduction of mobile services in the frequency band, while coordinating and matching the needs of mobile service providers and those of the satellite customers and other incumbent users of C-band services, than any of auction proposals outlined in the NPRM.[13]

27. However, we believe that the set aside for terrestrial mobile should be limited to 100 MHz, as contained in the original Alliance proposal[14]. Even allocation of 100 MHz to terrestrial mobile service will result in strong restrictions on occasional users such as ourselves. It must be kept in mind, too, that the original Alliance proposal envisioned, in addition to the 100 MHz, an additional 50 MHz to serve as a guard band for a total of 150 MHz was being taken from FSS and FS.

28. Since the NPRM was issued, the Alliance is now proposing to set aside 180 MHz for terrestrial mobile use, plus 20 MHz as a guard band, for a total of 200 MHz. This leaves only 300 MHz, instead of 350 MHz for FSS and FS. To the extent that spectrum designated for terrestrial mobile use is greater

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[13] In addition to the efficiency of a market-based solution over a spectrum auction, there is a question about whether the Commission has the statutory authority to auction the C-band. The Commission believes it has such authority. NPRM, ¶ 109. However, Section 647 of the ORBIT Act plainly states that the Commission "shall not have the authority to assign by competitive bidding orbital locations or spectrum used for the provision of international or global satellite communications services." 47 U.S.C. § 765f. The C-band spectrum is specifically and presently used by the existing licensees like Intelsat for "global communications services." Thus, there might be an even clearer prohibition to spectrum auctions than was presented in *Northpoint Technology, Ltd., and Compass Systems, Inc., v. F.C.C.*, 412 F.3d 145 (D.C. Cir. 2005).

[14] NPRM, ¶ 81.

than 100 MHz (plus guard band spectrum), it potentially will result in wiping out occasional use businesses such as PSSI Global. Thus, although we can support – albeit only as a far less preferred option to the status quo – the Alliance's original proposal for allocation of 100 MHz for terrestrial mobile use, we cannot support raising the allocation amount to 200 MHz. Every additional megahertz greater than 100 MHz damages our business exponentially. Every additional megahertz will make it more difficult to provide the quality of coverage of major sports, entertainment and other events that we can currently do for our customers and that they demand and have come to rely upon. Moreover, every megahertz of bandwidth released to terrestrial mobile use will have a direct correlation to the increase in cost to the bandwidth by occasional users, and therefore, on our clients.

29. **Reimbursement**. The strong possibility that the Commission might allocate spectrum as much as 200 MHz makes it imperative to highlight the matter of the financial impact upon C-band users like PSSI Global. In the NPRM, the Commission asks what the basis would be for establishing reasonable cost reimbursements, as well as specifically how should satellite news gathering vehicles or other temporary-fixed earth stations be addressed.[15]

30. We believe that any reimbursement to transportable providers like PSSI Global would have to include the following:

- Reimbursement for investment, plus interest. It is significant that PSSI Global has had to increase C-band capabilities in recent years because of customer demands. Besides purchasing new and used C-band trucks, PSSI Global has converted numerous Ku-band vehicles to C-band capability.
- Reimbursement for loss of business and future revenue.
- Reimbursement for loss opportunities (where might the investments been made otherwise, if we had not depended on our FCC C-band licenses?).

[15] NPRM at ¶ 29.

- Reimbursement for having to manage customer contract changes and needs (for example, NASCAR, WWE, and The Golf Channel, etc.) where PSSI Global has invested millions of dollars in building specific C-band trucks to meet their needs.

- Reimbursement for having to address managing employment loss for many of our engineers and staff.

Moreover, the Commission must make this a binding obligation upon either the satellite companies of the Alliance or the terrestrial mobile carriers, whichever ends up operating in this band by a date specific following the transition that is no later than 90 days after the date of the issuance of the initial license of the terrestrial mobile operators or the date that PSSI Global must cease operating in portions of the C-band, whichever occurs first. In good faith reliance upon the rules and policies of the Commission, C-band users like PSSI Global have invested millions of dollars over the years in equipment, people, processes and training to provide the necessary services for its clients, and still have equipment orders being processed for additional C-band amplifiers and antennae that have already been placed. They should be compensated.

31. **FWCC Proposal**. In the NPRM, the Commission invites comment on the proposal of the FWCC to eliminate full-band/full-arc coordination policies.[16] This would be necessary for to permit P2MP service in the band. PWCC contends that current procedures are spectrally inefficient because the full-band, full-arc coordination policy prevents point-to point operations on fallow spectrum in the band where there would be no harmful interference to any existing earth station operations.[17]

32. Such a proposal is totally incompatible with the existing uses of the C-band, including those of the mobile transportable industry. In Section A above, as well as in our June 25, 2018 *Ex Parte* Letter, we have explained how PSSI Global and other mobile transportable users operate under the current

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[16] NPRM, ¶ 38.

[17] *Id.*

rules. These current rules enable PSSI Global to react dynamically to meet our customers' needs for the safe and reliable transmission of services from a particular venue, without our causing interference to others, or being interfered with ourselves because of the full-band/full-arc regime. The precise C-band frequencies and satellites on which PSSI Global operates for any given event depend on both the frequencies cleared at the specific location and the satellite capacity to which PSSI Global has access to on an occasional use basis. Because our licensed transportable earth stations have no fixed latitude and longitude, we must coordinate for each venue from which we intend to transmit. As noted in the examples of NCAA college football, basketball, and professional sports playoffs, these are subject to change with as little as one week's notice; sometimes less. If P2MP service were to be authorized, this ability to coordinate and accommodate last minute programming requests would not be possible and would have a devasting effect on the ability to conduct these broadcasts.

33. Authorizing P2MP in the C-band is unacceptable, not only to PSSI Global, but also to the C-Band Alliance and others as well because of the incompatibility of the two services. Accordingly, we vigorously opposed the FWCC proposal, most particularly with respect to restrictions on full-band/full-arc coordination.

34. **Flexible and alternative uses**. The Commission requested comment on expanding flexible and more intensive fixed use of the band without causing harmful interference to incumbent operations.[18] For the reasons outlined above, we do not believe that is possible.

35. If spectrum is reallocated to terrestrial mobile use, however, one "fix" could involve reserving certain portions of the C-band for specific uses by incumbents. For example, a portion of the higher C-band frequency spectrum could be set aside for non-preemptible occasional use and mid-range

[18] NPRM, ¶ 54.

transponders for all broadcaster programming distribution[19]. Although there would still be capacity constraints from the greatly reduced amount of spectrum available for FSS and mobile transportable systems, there could be more certainty that there would continue to be spectrum for occasional use.

36. **Alternative Technology**. The Commission has asked whether there exist alternative technologies available that could wholly or partially replace the services provided by FSS without significant disruption to existing customers[20]. We know of no alternative technologies to C-band to facilitate usage than what we are already doing to optimize our use on behalf of our customers. C-Band is very efficient and preferred over Ku-band for the many reasons already mentioned, including preferred performance in inclement weather, and the ability to provide increased multi-path multiplexed services. Ku-band cannot provide the throughput for these complex multi-path solutions. Fiber as an alternative is effective but also has limitations. In certain instances, fiber is not a viable alternative either based on its cost or even availability or connectivity. For example, although large, multi-use stadium facilities have robust fiber connections, many locations we serve do not have adequate or reliable fiber service availability to support adequately or reliably all the services that we perform for our clients. For example, as noted above, at most golf courses, there is no fiber infrastructure, and we are the only transmission pathway available, so that satellite is the only solution for most Golf Channel events.

37. **Transition Facilitator**. In furtherance of the market approach which we support as an

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[19] The Alliance's proposal is evidently a work in progress, as the companies refine their plan to accommodate more spectrum for mobile use. For example, it has already increased the amount of spectrum that it seeks to set aside for terrestrial mobile use from 100 MHz to 200 MHz. Similar commitments need to be made for occasional use. The proposal should be modified to provide a minimum number of transponders for occasional use on a non-preemptible basis to permit to permit satellite uplink in the 6 GHz band, and downlink in the 4 GHz band, on designated bandwidth, not just in the designated set-aside bandwidth utilized to contractually back-up full time non-pre-emptible users or services.

[20] NPRM, ¶ 57.

alternative to the existing regulatory regime, the Commission has proposed creation of a Transition Facilitator "to coordinate negotiations, clearing, and repacking the band."[21] As the Commission sees it, such a Transition Facilitator would be "cooperative entity created by relevant satellite operators."[22] PSSI Global agrees that management of the introduction of mobile service into the band through such Transition Facilitator would be the most efficient means of accomplishing the change.

38. PSSI Global does not believe that the incumbent FSS operators should be the sole arbiters of the compensation for those being required to clear the band in such a rapid transition of the spectrum to terrestrial mobile use. Management and control of the Transition Facilitator should not be limited to the satellite operators. A market-oriented mechanism like the Transition Facilitator should also include and represent the existing users of the spectrum like PSSI Global and large-scale users like the media companies, in addition to the "providers", i.e., the satellite operators. Involvement of all stakeholders currently using the C-band can facilitate restructuring of the band.

39. Accordingly, there should be a supervisory board of administration for the Transition Facilitator whose membership includes users like PSSI Global, who can best understand how to continue to make the reduced capacity in the C-band function for users. PSSI Global, as the leading provider of transportable mobile services, should represent that sector in the Transition Facilitator administration.

40. The Commission has asked about possible antitrust concerns that might arise from control of the process by existing FSS operators alone[23]. Representation in the Transition Facilitator by all

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[21] NRPM, ¶ 70.

[22] *Id.*

[23] NPRM, ¶ 67.

segments of the existing C-band market can also alleviate concerns about possible anti-competitive activity by the satellite operators by having both sides of the existing economic equation – satellite providers and their customers -- involved in the decision-making for reorganizing the band.

41. Thus, with the modifications proposed above, PSSI Global can support the mechanism that the Commission has proposed for how the Transition Facilitator would carry out its work, as laid out in paras. 72-97 of the NPRM.

42. PSSI Global also urges the Commission to set strong deadlines for resolution of the transition process. The needs of the C-band user community compel that the Commission not have a more than decade's long transition process, as has occurred in the 800 MHz repacking. Having the user community represented in the Transition Facilitator, as proposed by PSSI Global, can help ensure that the transition process is more rapid than the far too lengthy 800 MHz repackaging (now more than 12 years).

C. Conclusion

43. As a leader among transportable satellite system operators, PSSI Global believes that the preferred outcome of this proceeding would have the Commission retain the status quo in the C-band. The Commission should reject both terrestrial mobile and P2MP service in the C-band. We have demonstrated that the changes proposed in the NPRM are potentially disastrous to our company and would result in a great loss in revenue, employment and service to the public at large.

44. The Alliance proposal does provide a possible alternative but is acceptable only with certain important limitations. The amount of spectrum allocated to terrestrial mobile should be limited to 100 MHz. Moreover, the market-based mechanisms that are employed such as the Transition Facilitator require the input and supervision of the users of the C-band, not just the satellite operators.

45. To the extent that transportable satellite system operators and other holders of licenses and authorizations incur costs for, inter alia, relocation of facilities, loss of authorizations or equipment changes, such costs should be funded by the satellite and mobile operators.

46. In any event, the Commission should reject FWCC's proposal for P2MP services in the C-band.

Respectfully submitted,

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Dated: October 29, 2018

COLLEGE FOOTBALL FOR FOX AND ESPN

Summary

NCAA college football is PSSI Global Services' highest volume market for transportable uplink services. In 2018, we will have uplink trucks at over 75 regular season games for the Fox networks, 50 games for the CBS networks, and approximately 50 more games for regional sports networks. We will also have a presence at approximately 30 bowl games throughout the continental US as well as Hawaii.

Case Studies

FOX

- Up to 8 games per Saturday in the PAC 12, Big 10, and Big 12 football conferences, plus the Big 10 and PAC 12 championship games. For games on Fox Sports 1, Fox utilizes a fiber path out of the stadium and a C-band uplink for redundancy. For stadiums without fiber infrastructure, Fox requests a Ku-band pathway to back up the C-band pathway. These are full 36mhz segments, averaging 7 hours per game, including testing.
- A weekly 4K broadcast on Fox Sports 1 requires (2) separate C-band paths from site. This is a 4K/HD multiplexed transmission on a 36mhz transponder.

ESPN

- Throughout the regular season, we provide ESPN with multiplexed C-band transmissions for their "at-home" productions of college football games. This is up to 10 channels of video with 4 audios on each channel distributed back to ESPN headquarters in Bristol, CT, where they produce the game for broadcast. These games require, on average, 10 hours of C-band space segment, and the 10-channel transmissions utilize 54mhz of bandwidth. C-band transmission is required due to the possibility of rain both at origination and receive.
- For the "Big 6" Bowl games as well as the Colllege Football National Championship, ESPN requires multiple C-band uplinks. The "Big 6" - Rose, Sugar, Cotton, Orange, Fiesta, and Peach Bowls - requires up to 10 channels of multiplexed video and audio for distribution back to ESPN headquarters in Bristol, CT, where the game is produced. C-band transmission is required due to the possibility of rain both at origination and receive.
- For the Rose Bowl and Sugar Bowl, PSSI also encodes and multiplexes multiple video signals for distribution via fiber back to ESPN headquarters. In addition to the games themselves, these transmissions include multiple days of ESPN programming, including press conferences, player interviews, and remote shows such as SportsCenter.
- For the National Championship, PSSI encodes, multiplexes, and transmits 20 video paths, with 16 audio channels per path, between (2) C-band antennas. In addition to the game itself, this includes multiple days of ESPN programming, including press conferences, player interviews, and remote shows such as SportsCenter.

- PSSI also encodes and multiplexes 23 video paths for distribution via fiber back to ESPN headquarters in Bristol, both as a redundant means of transmission and to provide additional cameras and other content not included on the satellite paths.

NASCAR

PSSI Global Services is the exclusive satellite transmission provider for NASCAR. Our C27 mobile teleport, with (2) C-band antennae, is at every Monster Energy Cup Series and Xfinity Series Race at tracks across the country. We are provide extensive satellite service on the Camping World Truck Series races as well as the IMSA WeatherTech SportsCar Championship series. For the latter, we have transmitted 28 multiplexed video paths and over 100 audios via satellite across two C-band transponders. We consistently provide services for NASCAR that would be impossible on a Ku-band platform.

The C27 is a dual C-band antenna tractor-trailer dedicated to the entire NASCAR Cup Series (and more) each year. We not only uplink multiple paths and all in-car audios, we also downlink their composite return from Charlotte for integration into the onsite production as well as for distribution to thousands of screens – including large screens – at each track. Therefore, the C-band satellite transport to and from each NASCAR track is essential not only for broadcast distribution to millions of NASCAR fans worldwide on multiple platforms, but also for the fan experience at the track itself.

Perhaps more than any customer, NASCAR has pushed PSSI Global Services to develop advanced technical solutions to an increasingly complex broadcast environment. Our mutual efforts have yielded an Emmy Award for Technical Excellence, to be announced in 2019. Our technological achievements would not have been possible with anything but C-band frequencies, as the higher order modulation required for such complex, high bandwidth, multi-path transmissions would not be possible in Ku-band.

To date in 2018, NASCAR has used over 2,000 hours of C-band space segment at full transponder across some 107 NASCAR events. Our average weekly usage on the Monster Energy Cup Series is 38.5 hours per weekend.

Case Study – Daytona Race Weekend, February 2018

DAYTONA C-BAND USAGE

2/9 - 3 Hours

2/10 - 12 Hours

2/11 - 8.25 Hours

2/14 - 8.5 Hours

2/14 - 8.5 Hours

2/15 -12.75 Hours

2/16 - 14.75 Hours

2/17 - 10.25 Hours

2/18 - 9.5 Hours

Total – 87.5 Hours of 36mhz C-band space for multiple races, testing, and network returns

2018 Race Locations – Monster Energy Cup Series and IMSA Races

Monster Energy Cup Series

1. Atlanta Motor Speedway, Hampton GA
2. Auto Club Speedway – Fontana, CA
3. Bristol Motor Speedway – Bristol, TN
4. Charlotte Motor Speedway – Concord, NC
5. Chicagoland Speedway – Joliet, IL
6. Darlington Raceway – Darlington, SC
7. Daytona International Speedway – Daytona Beach, FL
8. Dover International Speedway – Dover, DE
9. Homestead-Miami Speedway – Homestead, FL
10. Indianapolis Motor Speedway – Indianapolis, IN
11. Kansas Speedway – Kansas City, KS
12. Kentucky Speedway – Sparta, KY
13. Las Vegas Motor Speedway – Las Vegas, NV
14. Martinsville Speedway – Martinsville, VA
15. Michigan International Speedway – Brooklyn, MI
16. New Hampshire Motor Speedway – Loudon, NH
17. Phoenix International Raceway – Avondale, AZ
18. Pocono Raceway – Pocono, PA
19. Richmond International Raceway – Richmond, VA
20. Sonoma Raceway – Sonoma, CA
21. Talladega Superspeedway – Talladega, AL
22. Texas Motor Speedway – Justin, TX
23. Watkins Glen International – Watkins Glen, NY

IMSA WeatherTech SportsCar Championship Series

1. Daytona International Speedway - Daytona, FL
2. Sebring International Raceway – Sebring, FL
3. Long Beach Grand Prix – Long Beach, CA
4. Mid Ohio Sports Car Course – Lexington, OH
5. Detroit Grand Prix – Detroit, MI
6. Watkins Glen – Watkins Glen, NY
7. Canadian Tire Motorsport Park – Bowmanville, ON
8. Lime Rock – Lakeville, CT
9. Road America – Elkhart Lake, WI
10. Virginia International Raceway – Alton, VA
11. Laguna Seca – Salinas, CA
12. Road Atlanta – Braselton, GA

UFC -- Ultimate Fighting Championship

The mixed martial arts promotion company UFC, through a contractual partnership with the production company Concom, is one of our highest volume customers. We provide transmission and project management services for events all over the world, from pay-per-view (PPV) events, to regional broadcasts that air on the Fox networks, to online-only OTT content. See below for a summary of our UFC-related services.

Pay-per-view: 13 events in 2018, utilizing the following transmission configurations:

C-band

- Fox primary path - 14 hours per event of 36mhz C-band space segment
- UFC Primary path - 12.5 hours per event of 36mhz C-band space segment
- International feed and post-event press conference - 10.25 hours per event of 36mhz C-band space segment
- Studio Inbound from Fox - 6 hours per event of 18mhz C-band space segment from Fox Studios in Los Angeles to our SNG at origination, which includes content from Fox Studios for insertion into event programming
- 4K path - 12 hours per event of 36mhz C-band space segment for a standalone 4K pathway
- Pre-fight media events - variable per event, averaging 5 hours of C-band space segment per event

Ku-band

- Fox backup path - 9.25 hours per event
- UFC backup path - 8 hours per event

UFC on FS1: 17 events in 2018, utilizing the following transmission configurations:

C-band

- Fox primary path - 10.5 hours of C-band space segment per event
- Fox "clean" path - 9/25 hours of C-band space segment per event
- Studio Inbound from Fox - 5.75 hours of C-band space segment per event, with content from Fox Studios in Los Angeles

Ku-band

- Fox backup path - 9.25 hours of Ku-band space segment

UFC Fight Night: 4 events in 2018

C-band

- UFC primary path - 9.25 hours of C-band segment per event

Ku-band

- UFC backup path - 7.25 hours of Ku-band segment per event

UFC on Fox: 5 events in 2018

C-band only for the only pathway out of the venue, 10.5 hours of C-band segment per event.

List of 2018 UFC/Concom Services

Concom UFC	UFC PPV 219 4K	TMOBILE	12/31/2017
Concom UFC	UFC Fight Night on FS1: Stephens vs. Choi - St. Louis, MO	Scottrade Center	1/14/2018
Concom UFC	UFC 220 PPV: Miocic vs. Ngannou - Boston, MA	TD Garden	1/21/2018
Concom UFC	UFC 220 4K/HDR PPV Boston	TD Garden	1/21/2018
Concom UFC	UFC Fight Night on FOX #27: Jacare vs. Brunson - Charlotte, NC	Spectrum Center	1/27/2018
Concom UFC	FS1 -72 Belem Brazil	Mangueirinho Arena	2/4/2018
Concom UFC	UFC 221 PPV: Rockhold vs. Romero - Perth, Australia	Perth Arena	2/11/2018
Concom UFC	FS-1 73 Austin, TX	Frank Erwin Center	2/19/2018
Concom UFC	UFC Fight Night on FOX #28: Emmett vs. Stephens - Orlando, FL	The Amway Center	2/24/2018
Concom UFC	UFC PPV 222 Las Vegas	T-Mobile	3/4/2018

Concom UFC	UFC PPV 223 Brooklyn NY	Barclays Arena	4/8/2018
Concom UFC	UFC Fight Night on FOX #29: Gaethje vs. Poirier - Glendale, AZ	Gila River Arena	4/15/2018
Concom UFC	UFC FS1 74 Atlantic City NJ	Boardwalk Hall	4/22/2018
Concom UFC	UFC 224 PPV: Nunez vs. Pennington - Rio De Janeiro, Brazil	Rio Olympic Arena	5/13/2018
Concom UFC	UFC FS1-75 Chile : Monitoring and AV	Movistar	5/19/2018
Concom UFC	UFC On FS1 75 Chile	Movistar Arena	5/20/2018
Concom UFC	UFC Chile Production Support	Movistar	5/20/2018
Concom UFC	UFC Fight Night on FS1: Till vs. Thompson - Liverpool, England	The Echo Arena	5/27/2018
Concom UFC	FS1 77 Utica, NY	Adirondack Bank Arena	6/1/2018
Concom UFC	UFC 225 PPV: Whittaker vs. Romero 2 - Chicago, IL	The United Center	6/9/2018
Concom UFC	Fight Night Singapore	Singapore Indoor Stadium	6/23/2018
Concom UFC	The Ultimate Fighter 27 Finale: Undefeated - July 6th - Las Vegas, NV	The Pearl Theater	7/7/2018
Concom UFC	UFC 226 PPV: Miocic vs. Cormier - July 7th - Las Vegas, NV	The T-Mobile Arena	7/8/2018
Concom UFC	UFC PPV 226 4K HDR PPV	T-Mobile Arena	7/8/2018
Concom UFC	UFC Fight Night on FS1: Santos vs. Ivanov - July 14th - Boise, ID	CenturyLink Arena	7/14/2018
Concom UFC	UFC on FS-1 79 Hamburg Germany	BarclayCard	7/23/2018

Concom UFC	UFC Fight Night on FOX #30 - Alvarez vs. Poirier - Calgary, Canada	Scotiabank Saddledome	7/28/2018
Concom UFC	UFC 227 PPV LA CA	Staples Center	8/5/2018
Concom UFC	FS1- 80 Lincoln Nebraska	Pinnacle Bank	8/26/2018
Concom UFC	FN Beijing China	Cadillac Arena	8/26/2018
Concom UFC	FS1-82 Moncton Canadian Services -1	Moncton Events Center	8/27/2018
Concom UFC	UFC PPV 232 Las Vegas	T-Mobile Arena	8/27/2018
Concom UFC	UFC 228 PPV: Woodley vs. Till - September 8th - Dallas, TX	American Airlines Center	9/8/2018
Concom UFC	UFC 229 PPV - Pre-Event Press Conference - September 20th	Radio City Music Hall	9/20/2018
Concom UFC	UFC Fight Night on FS1: Manuwa vs. Tiexiera - Sao Paulo, Brazil	Ginásio do Ibirapuera	9/22/2018
Concom UFC	FS1-82 Moncton Non Canadian Services -2	Moncton Events Center	9/27/2018
Concom UFC	UFC PPV 229	T-Mobile	10/7/2018
Concom UFC	UFC PPV 229 4K HDR	T-Mobile	10/7/2018
Concom UFC	UFC 230 PPV: Cormier vs. Lewis - Nov. 3rd. - N.Y.C.	Madison Square Garden	11/4/2018
Concom UFC	FS1-83 Denver	Pepsi Center	11/10/2018
Concom UFC	TUF 28 Las Vegas	The Palms	11/30/2018
Concom UFC	UFC PPV 231 Toronto	Scotiabank Arena	12/8/2018

WWE -- World Wrestling Entertainment

We are the exclusive transmission partner for all WWE events, with a dedicated C/Ku mobile teleport that travels to all domestic events for live transmission on RAW, Smackdown, and multiple pay-per-view (PPV) events. We also provide international transmission services for WWE's special events.

PPV Overview

For all PPV events for which PSSI Global Services provides project management and transmission services, one or more transmission pathway is ALWAYS satellite.

C-band satellite is typically required for the following reasons:

- Redundancy. Pathways include a combination of C-band, Ku-band and fiber.
- Weather. C-band is much less susceptible to weather-related signal degradation or outage.
- Availability of C-band space as opposed to Ku-band space. For occasional use, Ku-band is in much shorter supply.
- Throughput. Larger antenna sizing at both the transmit and receive ends allow for easier integration of multiplexed or expanded services.
- Reputation. Amongst producers of live sports and entertainment events, C-band is known for its reliability.

US Receive sites of PPV events (partial list, all C-band for primary):

- Amazon
- Armed Forces Network
- DirecTV
- DISH Network
- HBO
- iNDEMAND
- ION Media
- KCET
- MLBAM
- Neulion
- Nielson Group
- Showtime
- Turner
- UFC
- Vubiquity
- Yahoo

PPV Case Study - WWE

For a US-originating WWE PPV, we do five paths - 2 PPV, 2 Network, and 1 return, all in and out of the CK30 mobile teleport.

Hell in a Cell, September 16, 2018 – Core Requirements

- **3-service Mux - C-band**
  - PPV, Network, and WWE Stamford Path
- **3-service Mux – Ku-band**
  - PPV Path 2, Network, and WWE Stamford Path
- **Standalone C-band SD PPV Path**
- **Return path via C-band satellite and fiber**
  - 2-service mux (net return and elements)
- **InDemand return** (C-band uplink via the PSSI International Teleport)

List of 2018 WWE Services

WWE	WWE- RAW Miami, FL	American Airlines Arena	1/1/2018
WWE	WWE-SMACKDOWN Orlando, FL	Amway Center	1/2/2018
WWE	WWE RAW - Data Services	FedEx Forum	1/8/2018
WWE	WWE- RAW Memphis, TN	Fedexforum	1/8/2018
WWE	WWE-SMACKDOWN Birmingham, AL	Legacy Arena	1/9/2018
WWE	WWE RAW - AT&T Data Services	AT&T Center	1/15/2018
WWE	WWE- RAW San Antonio, TX	AT&T Center	1/15/2018
WWE	WWE-SMACKDOWN Laredo, TX	Laredo Engergy Arena	1/16/2018
WWE	WWE 25th Anniversary Show	Manhattan Center Studios	1/22/2018
WWE	WWE- RAW Brooklyn, NY	Barclays Center	1/22/2018
WWE	WWE-SMACKDOWN Washington, DC	Capital One Arena	1/23/2018
WWE	WWE Philadelphia AT&T Data Services	Wells Fargo Center	1/26/2018
WWE	WWE- PPV NXT & Royal Rumble in Philadelphia, PA	Wells Fargo Center	1/26/2018
WWE	WWE NXT Live Philadelphia	Wells Fargo Center	1/27/2018
WWE	WWE PPV Royal Rumble 2018	Wells Fargo Center	1/28/2018
WWE	WWE- RAW Philadelphia, PA	Wells Fargo Center	1/29/2018
WWE	WWE-SMACKDOWN Philadelphia, PA	Wells Fargo Center	1/30/2018

WWE WWE- RAW Des Moines, IA	Wells Fargo Arena	2/5/2018
WWE WWE-SMACKDOWN Kansas City, MO	Sprint Center Arena	2/6/2018
WWE WWE- RAW San Jose, CA	SAP Center	2/12/2018
WWE WWE-SMACKDOWN Bakersfield, CA	Rabobank Arena	2/13/2018
WWE WWE-SMACKDOWN Phoenix, AZ	Talking Stick Resort Arena	2/20/2018
WWE WWE PPV Elimination Chamber 2018	T-Mobile Arena	2/25/2018
WWE WWE- PPV Elimination Chamber	T-Mobile Arena	2/25/2018
WWE WWE- RAW Anaheim, CA	Honda Center	2/26/2018
WWE WWE Smackdown - 1Gig Data circuit	Staples Center	2/27/2018
WWE WWE-SMACKDOWN Los Angeles, CA	Staples Center	2/27/2018
WWE WWE- RAW Milwaukee	BMO Harris Bradley Center	3/5/2018
WWE WWE- SMACKDOWN Green Bay, WI	Resch Center	3/6/2018
WWE WWE PPV Fastlane 2018	Nationwide Arena	3/11/2018
WWE WWE PPV- Fast Lane Columbus, OH	Nationwide Arena	3/11/2018
WWE WWE_AT&T Internet Nationwide Arena	Nationwide Arena	3/11/2018
WWE WWE- RAW Detroit, MI	Little Caesar's Arena	3/12/2018
WWE WWE-SMACKDOWN Indianapolis	Bankers Life Fieldhouse	3/13/2018
WWE WWE- RAW Dallas	American Airlines Center	3/19/2018
WWE WWE-SMACKDOWN Dallas, TX	American Airlines Center	3/20/2018
WWE WWE- RAW Cleveland, OH	Quickens Loans Arena	3/26/2018
WWE WWE-SMACKDOWN Pittsburgh, PA	PPG Paints Arena	3/27/2018
WWE WWE- RAW Atlanta, GA	Philips Arena	4/2/2018
WWE WWE-SMACKDOWN Nashville, TN	Bridgestone Arena	4/3/2018
WWE WWE- PPV Wrestlemania New Orleans, LA	Mercedes-Benz Superdome	4/5/2018
WWE WWE Hall of Fame 2018	Smoothie King Center	4/6/2018
WWE WWE PPV- Wrestlemania New Orleans	Mercedes-Benz Superdome	4/6/2018

WWE WWE NXT Live New Orleans 2018	Smoothie King Center	4/7/2018
WWE WWE PPV Wrestlemania 2018	Mercedes-Benz Superdome	4/8/2018
WWE WWE- RAW New Orleans	Smoothie King Center	4/9/2018
WWE WWE- RAW New Orleans, LA	Smoothie King Center	4/9/2018
WWE WWE-SMACKDOWN New Orleans	Smoothie King Center	4/10/2018
WWE WWE-SMACKDOWN New Orleans, LA	Smoothie King Center	4/10/2018
WWE WWE- RAW Hartford, CT	XL Center	4/16/2018
WWE WWE-SMACKDOWN Providence, RI	Dunkin Donuts Center	4/17/2018
WWE WWE- RAW St. Louis, MO	Scottrade Center	4/23/2018
WWE WWE-SMACKDOWN Louisville, KY	KFC Yum Center	4/24/2018
WWE WWE- RAW Montreal, QC	Bell Centre	4/30/2018
WWE WWE-SMACKDOWN Montreal, QC	Bell Centre	5/1/2018
WWE WWE-PPV BACKLASH Newark, NJ	Prudential Center	5/6/2018
WWE WWE- RAW Uniondale, NY	Nassau Coliseum	5/7/2018
WWE WWE-SMACKDOWN Baltimore, MD	Royal Farms Arena	5/8/2018
WWE WWE- RAW Albany, NY	Times Union Center	5/21/2018
WWE WWE-SMACKDOWN Worcester, MA	DCU Center	5/22/2018
WWE WWE- RAW Richmond, VA	The Coliseum	5/28/2018
WWE WWE-SMACKDOWN Raleigh, NC	PNC Arena	5/29/2018
WWE WWE- RAW Houston	Toyota Center	6/4/2018
WWE WWE-SMACKDOWN Corpus Christi	American Bank Center Arena	6/5/2018
WWE WWE- RAW Little Rock	Verizon Arena	6/11/2018
WWE WWE-SMACKDOWN Memphis	Fedexforum	6/12/2018
WWE WWE NXT Live Rosemont 2018	Allstate Arena	6/16/2018
WWE WWE- NXT & PPV Money in the Bank: Chicago	Allstate Arena	6/16/2018
WWE WWE PPV Money in the Bank 2018	Allstate Arena	6/17/2018

WWE WWE- RAW Grand Rapids	Van Andel Arena	6/18/2018
WWE WWE-SMACKDOWN Toledo	Huntington Center	6/19/2018
WWE WWE- RAW San Diego	Valley View Casino Center	6/25/2018
WWE WWE-SMACKDOWN Ontario, CA	Citizens Business Bank Arena	6/26/2018
WWE WWE- RAW Sioux Falls, SD	Denny Sanford Premier Center	7/2/2018
WWE WWE-SMACKDOWN Omaha, NE	CenturyLink Center	7/3/2018
WWE WWE- RAW Boston, MA	TD Garden	7/9/2018
WWE WWE-SMACKDOWN Manchester, NH	SNHU Arena	7/10/2018
WWE WWE- PPV Extreme Rules Pittsburgh, PA	PPG Paints Arena	7/15/2018
WWE WWE- RAW Buffalo, NY	Key Bank Center	7/16/2018
WWE WWE-SMACKDOWN Wilkes Barre, PA	Mohegan Sun Arena @ Casey Plaza	7/17/2018
WWE WWE- RAW Cincinnati, OH	US Bank Arena	7/23/2018
WWE WWE-SMACKDOWN Evansville, IN	Ford Center Evansville	7/24/2018
WWE WWE- RAW Miami, FL	American Airlines Arena	7/30/2018
WWE WWE-SMACKDOWN Tampa, FL	Amalie Arena	7/31/2018
WWE WWE- RAW Jacksonville, FL	Veteran's Memorial Arena	8/6/2018
WWE WWE-SMACKDOWN Orlando, FL	Amway Center	8/7/2018
WWE WWE- RAW Greensboro, NC	Greensboro Coliseum	8/13/2018
WWE WWE-SMACKDOWN Greenville, SC	Bon Secours Wellness Arena	8/14/2018
WWE WWE- PPV SummerSlam (+NXT TAKEOVER)	Barclays Center	8/17/2018
WWE WWE NXT Live Brooklyn 2018	Barclays Center	8/18/2018
WWE WWE PPV SummerSlam 2018	Barclays Center	8/19/2018
WWE WWE- RAW Brooklyn, NY	Barclays Center	8/20/2018
WWE WWE-SMACKDOWN Brooklyn, NY	Barclays Center	8/21/2018
WWE WWE- RAW Toronto, Canada	Air Canada Centre	8/27/2018

WWE WWE-SMACKDOWN Toronto, Canada	Air Canada Centre	8/28/2018
WWE WWE- RAW Columbus, OH	Schottenstein Center	9/3/2018
WWE WWE-SMACKDOWN Detroit, MI	Little Caesar's Arena	9/4/2018
WWE WWE- RAW New Orleans, LA	Smoothie King Center	9/10/2018
WWE WWE-SMACKDOWN Lafayette, LA	Cajundome	9/11/2018
WWE WWE- PPV Hell in a Cell - San Antonio	AT&T Center	9/16/2018
WWE WWE- RAW Dallas, TX	American Airlines Center	9/17/2018
WWE WWE-SMACKDOWN Tulsa, OK	BOK Center	9/18/2018
WWE WWE- RAW Denver, CO	Pepsi Center	9/24/2018
WWE WWE-SMACKDOWN Denver, CO	Pepsi Center	9/25/2018
WWE WWE- RAW Seattle, WA	Key Arena	10/1/2018
WWE WWE-SMACKDOWN Portland, OR	Moda Center	10/2/2018
WWE WWE Melbourne Australia Super Show-Down 2018	Melbourne Cricket Grounds	10/5/2018
WWE WWE- RAW Chicago, IL	Allstate Arena	10/8/2018
WWE WWE-SMACKDOWN Indianapolis, IN	Bankers Life Fieldhouse	10/9/2018
WWE WWE- RAW Philadelphia, PA	Wells Fargo Center	10/15/2018
WWE WWE-SMACKDOWN Washington, DC	Capital One Arena	10/16/2018
WWE WWE- RAW Providence, RI	Dunkin Donuts Center	10/22/2018
WWE WWE-SMACKDOWN Newark, NJ	Prudential Center	10/23/2018
WWE WWE-PPV WWE Evolution-Uniondale, NY	Nassau Coliseum	10/27/2018
WWE WWE PPV Evolution 2018_Uniondale, NY	Nassau Veterans Memorial Coliseum	10/28/2018
WWE WWE- RAW Charlotte, NC	Spectrum Center	10/29/2018
WWE WWE-SMACKDOWN Atlanta, GA	Philips Arena	10/30/2018
WWE WWE- RAW Kansas City	Sprint Center	11/12/2018
WWE WWE-SMACKDOWN St. Louis, MO	Enterprise Center	11/13/2018

WWE	WWE- PPV Survivor Series + NXT Takeover- Los Angeles, CA	Staples Center	11/17/2018
WWE	WWE- RAW Los Angeles, CA	Staples Center	11/19/2018
WWE	WWE-SMACKDOWN Los Angeles, CA	Staples Center	11/20/2018
WWE	WWE- RAW Milwaukee, WI	Milwaukee Bucks Arena	11/26/2018
WWE	WWE-SMACKDOWN Minneapolis, MN	Target Center	11/27/2018
WWE	WWE- RAW Houston, TX	Toyota Center	12/3/2018
WWE	WWE-SMACKDOWN Austin, TX	Frank Erwin Center	12/4/2018
WWE	WWE- RAW San Diego, CA	Valley View Casino Center	12/10/2018
WWE	WWE-SMACKDOWN Las Vegas, NV	T-Mobile Arena	12/11/2018
WWE	WWE- PPV TLC-San Jose, CA	SAP Center	12/16/2018
WWE	WWE- RAW Sacramento, CA	Golden 1 Center	12/17/2018
WWE	WWE-SMACKDOWN Fresno, CA	Save Mart Center	12/18/2018
WWE	WWE- RAW Detroit, MI	Little Caesar's Arena	12/28/2018
WWE	WWE-SMACKDOWN Pittsburgh, PA	PPG Paints Arena	12/29/2018

Golf Channel

PSSI Global Services has been the exclusive satellite transmission provider for Golf Channel for several years. PSSI has a presence at more than 135 live Golf Channel broadcasts a year, usually from golf courses around the country (plus the Bahamas). At most golf courses, there is no fiber infrastructure, and we are the only transmission pathway available. Golf Channel requires C-band transmissions due to the frequency of inclement weather at their receive site in Orlando, FL. Golf Channel does not have Ku-band receive capabilities. We provide C-band transmissions for all of their broadcasts, including tournament coverage, Golf Channel news, "Road Shows," and the Majors. For the Majors - the Masters, the US Open, and the PGA Championship - we also encode and multiplex for distribution via fiber. At each Major in 2018, disruptions to the fiber infrastructure required multiple paths to be distributed via C-band uplink, including inbound feeds from Golf Channel headquarters in Orlando.

List of 2018 Golf Channel Events and Services

Sentry Tournament of Champions

Morgan & Friends Fight Cancer Tournament

Sony Open in Hawaii

Diamond Resorts Celebrity Invitational

The Bahamas Great Exuma Classic

CareerBuilder Challenge

Mitsubishi Electric Championship

Bahamas Great Abaco Classic

Demo Day

Merchandise Show

Farmers Insurance Open (CBS Shared Event)

Pure Silk Classic

Waste Management Open (CBS Shared Event)

NBC Downlink

Boca Raton Championship (formally Allianz)

Genesis Open (CBS Shared Event)

Chubb Classic

The Honda Classic (CBS Shared Event)

GC News MD Live Shot

WGC Mexico Championship

Cologuard Classic (formally Tuscon Classic)

GC News MD Live Shot

GC News MD Live Shot

Valspar Championship

Toshiba Classic

Arnold Palmer Invitational- Road Show

Bank of Hope Founders Cup-Japan

WGC - Dell Technologies Match Play

WGC Match Play Selection Show

Corales Puntacana Resort & Club Championship

Kia Classic - Japan Enhancement

Rapiscan Systems Classic (formally MGRC)

Shell Houston Open- NBC Released 3/13/added on 3/29 fiber down

ANA Inspiration - Japan Enhancement

Drive, Chip & Putt National Championship

Live From the Masters

RBC Heritage (CBS Shared Event)

Lotte Championship

GC News Live Shot- Top Golf Orlando

Morning Drive Pinehurst Par-3 Event-reschedule

Mitsubishi Electric Classic

Valero Texas Open (CBS Shared Event)

GC News MD Live Shot

LPGA New Event (Los Angeles) -Japan

Bass Pro Shops Legends of Golf- 1st Truck

Bass Pro Shops Legends of Golf- 2nd ENG Truck

Zurich Classic (CBS Shared Event)

World Long Drive Tour-Clash in the Canyon

GC News- Morning Drive

LPGA San Francisco

United Leasing & Finance Championship

Wells Fargo Championship (CBS Shared Event)

North Texas VOA- Japan Enhancement

Insperity Invitational

The Player's Championship-Live From

AT&T Byron Nelson (CBS Shared Event)

World Long Drive Tour-Smash in the Sun

Kingsmill Championship -Japan Enhancement

BMW Charity Pro-Am

Regions Tradition

Women's NCAA Championship "Road Show"

Kitchenaid Senior PGA Championship "Road Show"

Dean & Deluca Invitational (CBS Shared Event)

LPGA Volvik Championship-Japan Enhancement

BMW PGA Championship

Men's NCAA Championship-Road Show

The Memorial Tournament (CBS Shared Event)

FedEx St Jude Classic (CBS Shared Event)

GC News MD Live Shot

World Long Drive Tour

Shoprite LPGA Classic -Japan Enhancement

Rustoleum Championship

Principal Charity Classic

Live From the US Open

Meijer LPGA Classic-Japan Enchancement

PGA Professional Championship

Travelers Championship-Road Show + News

WalMart NWA Championship -Japan Enhancement

American Family Insurance Championship

Quicken Loans National (CBS Shared Event)

KPMG Women's PGA Championship-Road Show

The Greenbrier Classic (CBS Shared Event)

Thornberry Creek Classic-Japanese Enhancement

Lecom Health Challenge

American Century -NBC Tourney

John Deere Classic (CBS Shared Event)

Marathon Classic -Japanese Enhancement

Utah Championship

Constellation Senior Players Championship

Aberdeen Asset Mgmt Scottish Open

The Open Championship

Live From the Open Championship

Barbasol Championship

The Senior Open Championship presented by Rolex

WGC - Bridgestone Invitational (CBS Shared Event)

Barracuda Open

3M Championship

Ricoh Women's Biristh Open

Live from the PGA Championship

GC News-World's Largest Golf Outing

Wyndham Championship (CBS Shared Event)

World Long Drive Series

IWIT Championship-Japan Enhancement

WinCo Foods Portland Open

Dick's Sporting Goods Open

The Northern Trust (CBS Shared Event)

Canadian Pacific Women's Open-Japan

Nationwide Children's Hospital Championship

Boeing Classic

Dell Technologies Championship

Cambia Portland Classic-Japan

DAP Classic

Shaw Charity Classic

Volvik World Long Drive Championship

GC News-Ryder Cup Presser- added on 8/23

BMW Championship

GC News-Ryder Cup Presser

The Evian Championship

Albertson's Boise Open

The Ally Challenge - New Event

Tour Championship by Coca Cola

Payne Stewart Award Show - TBA

WEB.Com Tour Championship

The Sanford International - New Event

Ryder Cup

Live From the Ryder Cup

Pure Insurance Championship

Safeway Open

UL International Crown

CIMB Classic

SAS Championship

Senior LPGA Championship

The CJ Cup @ Nine Bridges

Dominion Charity Classic

WGC HSBC Champions

Sanderson Farms Championship

Powershares QQQ Championship

East Lake Cup

Shriners Hospitals for Children Open

OHL Classic at Mayakoba

Charles Schwab Cup Championship

The RSM Classic

Hero World Challenge

QBE Shootout- GC

GC News-Morning Drive

PNC Father Son Challenge-NBC

PPV Overview – Mayweather vs. McGregor

For all PPV events for which PSSI Global Services provides project management and transmission services, one or more transmission pathway is ALWAYS satellite.

C-band satellite is typically required for the following reasons:

- Redundancy. Pathways include a combination of C-band, Ku-band and fiber.
- Weather. C-band is much less susceptible to weather-related signal degradation or outage.
- Availability of C-band space as opposed to Ku-band space. For occasional use, Ku-band is in much shorter supply.
- Throughput. Larger antenna sizing at both the transmit and receive ends allow for easier integration of multiplexed or expanded services.
- Reputation. Amongst producers of live sports and entertainment events, C-band is known for its reliability.

PPV Case Study II – Mayweather vs. McGregor, August 26, 2017

PSSI Global Services had an enormous presence at the most-watched pay-per-view in history — the fight between Floyd Mayweather Jr. and Conor McGregor at T-Mobile Arena in Las Vegas, NV on August 26, 2017.

Saturday night's fight at the T-Mobile Arena in Las Vegas has been called "the biggest commercial night in the history of combat sports." With an estimated 50 million U.S. viewers, plus millions more around the world, PSSI Global Services deployed an army of engineers and a fleet of satellite trucks and broadcast equipment to ensure a seamless broadcast for its clients and for viewers around the world.

For Showtime's pay-per-view broadcast of the fight, PSSI Global Services transmitted two backup paths. One of these paths was provided via the company's Frontline truck, which was also used to provide transmissions for the various media events leading up to the fight, including satellite media tours, fighter press conferences and the weigh-in.

The jewel of PSSI Global Services' fleet, the CK35 mobile teleport, provided the primary path for the main event out of its large-aperture C-band antenna. The CK35's Ku antenna was deployed and on a hot standby in case of any possible failure on the other paths.

PSSI Global Services also worked with several other broadcasters in the T-Mobile Arena's packed compound. Leveraging its C23 truck, the company provided extensive transmission services for all of Fox's ancillary broadcasts, including pre- and post-fight interviews, the FS1 desk show, and the prelims. Meanwhile, PSSI Global Services also provided transmission services from its K19 truck for British Sky Broadcasting's unilateral feed of the big event.

Last, but certainly not least, the company had a team of project managers on hand to ensure excellent results for each client, including the various international headend sites. These sites received a clean feed of the fight that originated in Las Vegas and was turned around at teleports for fiber and satellite distribution to more than 65 countries.

In summary:

Showtime

C-band Feeds

- Countdown show
- Weigh-in Show
- HD PPV Path
- SD PPV Path
- Post-Event Press Conference

- Additional C-band feeds
  - SD Puerto Rico PPV (from Intelsat Atlanta)
- C-band downlink of network return for InDemand at origination to verify signal for domestic distribution

Ku-band and fiber feeds

- Ku-band HD PPV Path 2
- Fiber HD PPV Path
- Satellite Media Tour and Inbound Feed - Ku-band SNG

UFC/IMG

- C-band Origination for International Distribution of Weigh-in, Prelims, and PPV Event
  - Over 70 international licensees in Latin America, Asia, and Europe
  - Latin American path turned at a domestic teleport to IS-21 (almost all Latin America head-ends cannot receive Ku-band)
- Fiber origination path as backup for World Feed

For multiple international ringside reporting and unilateral feeds: Ku-band SNG